

**Course 2E1 2005-06 (SF Engineers & MSISS & MEMS)****S h e e t 11**

---

Due: in the tutorial sessions next Wednesday/Thursday

---

**Exercise 1**

Find the area in polar coordinates  $(r, \theta)$  of the region  $R$ :

- (i)  $R$  is the region inside the curve  $r = \sqrt{1 - 2\sin\theta}$ ;
- (ii)  $R$  is the region inside the cardioid  $r = 1 + \sin\theta$ ;
- (iii)  $R$  is the region common to the interior of the cardioids  $r = 2 + 2\cos\theta$  and  $r = 2 - 2\cos\theta$ .

**Exercise 2**

Find the volume of the space region  $D$ :

- (i)  $D$  is the pyramid bounded by the coordinate planes and the plane  $2x + y + z = 2$ ;
- (ii)  $D$  is the prism bounded by the coordinate planes and the planes  $x + y = 2$ ,  $z = 2$ ;
- (iii)  $D$  is the region bounded the coordinate planes, the plane  $y + z = 1$  and the cylinder  $x = 4 - z^2$ .